

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

Claims 1-77 (Canceled)

78. (Currently Amended) A method for changing the temperature of a biological matter selected from the group consisting of semen, blood, blood cells, blood constituents and umbilical cord blood from an initial temperature via an intermediate temperature to a final temperature, one of the initial and final temperatures being above the freezing point of the said biological matter and the other being below the freezing point, comprising:

providing the said biological matter in the form of a sample ~~whose~~ having a minimal dimension in each of two mutually perpendicular cross-sections that exceeds 0.5 centimeters, and at least one of the cross-sections having an outer zone and an inner zone such that the temperature of the sample in the outer zone changes quicker than that in the inner zone;[[,]] and

changing the temperature of the said sample, the changing comprising ~~by the following steps:~~

(i) changing the temperature of the sample by subjecting it to a temperature gradient from the initial temperature to the intermediate temperature until the temperature of the sample in at least one part of the outer zone equals the

intermediate temperature whilst the temperature of the sample in the inner zone is different from the said intermediate temperature.₁[[;]]

(ii) further changing the temperature of the said sample by subjecting it to the intermediate temperature until the temperature of the said sample in at least one cross-section is uniform and equals the intermediate temperature.₁[[;]] and

(iii) changing the temperature of the said sample until the majority of the said sample is at the final temperature.

79 – 97. (Canceled)

98. (Currently Amended) The method of claim ~~Claim~~ 78, wherein the said sample is subjected in step (ii) to the said intermediate temperature until the temperature of the sample equals the said intermediate temperature.

99. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the changing of the temperature in step (i) is achieved by moving the sample through a region with a temperature gradient from the initial temperature to the intermediate temperature, and the changing of the temperature in step (iii) is achieved by moving the sample through a region with a temperature gradient from the intermediate temperature to the final temperature.

100. (Currently Amended) The method of claim ~~Claim~~ 78, wherein the ~~said~~ changing of the temperature is at least partially gradual and is achieved at least partially by the gradual movement of the ~~said~~ sample in the direction of a temperature gradient.

101. (Currently Amended) The method of claim ~~Claim~~ 100, wherein the changing of temperature in step (ii) is performed by placing the ~~said~~ sample in a region with the intermediate temperature, the ~~said~~ region having a length along the direction of the movement of the ~~said~~ sample and the ~~said~~ length is not less the length of the sample along the ~~said~~ direction of movement.

102. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the changing of the temperature in step (i) is achieved by moving the sample through a region with a temperature gradient from the initial temperature to the intermediate temperature, and the changing of the temperature in step (iii) is achieved by moving the sample through a region with a temperature gradient from the intermediate temperature to the final temperature.

103. (Currently Amended) The method according to claim ~~Claim~~ 102, wherein the sample has a leading end along the direction of movement and step (i) comprises:

- (a) moving the leading end of the into a region with a temperature gradient from the initial temperature to the intermediate temperature;
- (b) pausing the movement until seeding takes place at the leading end; and
- (c) moving the sample through the ~~said~~ region.

104. (Currently Amended) The method according to claim ~~Claim~~ 103, wherein the seeding in step (b) is achieved by introduction of liquid nitrogen to the ~~said~~ leading end of the sample.

105. (Currently Amended) The method according to claim ~~Claim~~ 101, wherein step (ii) comprises:

(a) moving the sample into the region with the intermediate temperature, until substantially the whole sample is within the ~~said~~ region;

(b) pausing the movement of the sample within the ~~said~~ region until the temperature of the sample is substantially uniform throughout the sample and equals the intermediate temperature; and

(c) moving the sample out of the ~~said~~ region.

106. (Currently Amended) The method according to claim ~~Claim~~ 100, wherein the velocity of movement in step (i) is equal to the velocity of movement in step (iii).

107. (Currently Amended) The method according to claim ~~Claim~~ 100, wherein the velocity of movement in step (i) is different from the velocity of movement in step (iii).

108. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the volume of the sample exceeds 5 milliliters.

109. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the volume of the sample is 12 milliliters or more.

110. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the volume of the sample is 50 milliliters or more.

111. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the sample comprises blood cells.

112. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the sample comprises plasma.

113. (Currently Amended) The method according to any claim ~~Claim~~ 78, wherein the sample comprises one or more embryos.

114. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the sample comprises semen.

115. (Currently Amended) The method according to claim ~~Claim~~ 78, wherein the sample is taken from humans.

116-118. (Canceled)

119. (Currently Amended) A method according to claim ~~Claim~~ 78, wherein step (ii) comprises moving the sample into a region with the intermediate temperature and subjecting the sample to the intermediate temperature in the ~~said~~ region until the temperature of the ~~said~~ sample in each cross-section taken perpendicularly to the ~~said~~ direction reaches the intermediate temperature by the time it is moved out of the ~~said~~ region.

120. (Currently Amended) A method for changing the temperature of a biological matter selected from the group consisting of semen, blood, blood cells, blood constituents and umbilical cord blood from an initial temperature via an intermediate temperature to a final temperature, one of the initial and final temperatures being above the freezing point of the ~~said~~ matter and the other being below the freezing point, comprising:

providing the ~~said~~ biological matter in the form of a sample ~~whose~~ having a minimal dimension in each of two mutually perpendicular cross-sections exceeds 0.5 centimeters, and at least one of the cross-sections having an outer zone and an inner zone such that the temperature of the sample in the outer zone changes quicker than that in the inner zone, and

changing the temperature of the ~~said~~ sample, the changing comprising ~~by the following steps:~~

(i) changing the temperature of the sample by subjecting it to a temperature gradient from the initial temperature to the intermediate temperature until the temperature of the sample in at least one part of the outer zone equals the intermediate temperature whilst the temperature of the sample in the inner zone is

different from the said intermediate temperature, the said changing is performed by placing the said sample in a region with the intermediate temperature, the said region having a length along the direction of the movement of the said sample and the said length is not less the length of the sample along the said direction of movement₁[[;]]

(ii) further changing the temperature of the said sample by subjecting it to the intermediate temperature until the temperature of the said sample in at least one cross-section is uniform and equals the intermediate temperature₁[[;]] and

(iii) changing the temperature of the said sample until the majority of the said sample is at the final temperature.

121. (Currently Amended) A method for changing the temperature of a biological matter selected from the group consisting of semen, blood, blood cells, blood constituents and umbilical cord blood from an initial temperature via an intermediate temperature to a final temperature, one of the initial and final temperatures being above the freezing point of the said matter and the other being below the freezing point, comprising:

providing the said biological matter in the form of a sample whose having a minimal dimension in each of two mutually perpendicular cross-sections exceeds 0.5 centimeters, and at least one of the cross-sections having an outer zone and an inner zone such that the temperature of the sample in the outer zone changes quicker than that in the inner zone₁[[,]] and

changing the temperature of the said sample, the changing comprising by the following steps:

- (i) (a) changing the temperature of the sample by subjecting it to a temperature gradient from the initial temperature to the intermediate temperature until the temperature of the sample in at least one part of the outer zone equals the intermediate temperature whilst the temperature of the sample in the inner zone is different from the said intermediate temperature, the said changing is achieved by moving the sample through a region with a temperature gradient from the initial temperature to the intermediate temperature, the said sample has a leading end along the direction of movement₁[[:]]
- (b) moving the leading end of the into a region with a temperature gradient from the initial temperature to the intermediate temperature₁[[:]]
- (c) pausing the movement until seeding takes place at the leading end; and moving the sample through the said region₁[[:]]
- (ii) further changing the temperature of the said sample by subjecting it to the intermediate temperature until the temperature of the said sample in at least one cross-section is uniform and equals the intermediate temperature₁[[:]] and
- (iii) changing the temperature of the said sample until the majority of the said sample is at the final temperature, the said changing is achieved by moving the sample through a region with a temperature gradient from the intermediate temperature to the final temperature.

122. (Currently Amended) A method for changing the temperature of a biological matter selected from the group consisting of semen, blood, blood cells, blood constituents and umbilical cord blood from an initial temperature via an intermediate temperature to a final temperature, one of the initial and final temperatures being above the freezing point of the said matter and the other being below the freezing point, comprising:

providing the said biological matter in the form of a sample ~~whose~~ having a minimal dimension in each of two mutually perpendicular cross-sections exceeds 0.5 centimeters, and at least one of the cross-sections having an outer zone and an inner zone such that the temperature of the sample in the outer zone changes quicker than that in the inner zone;[[,]]
and

changing the temperature of the said sample, the changing comprising ~~by the~~ following steps:

- (i) changing the temperature of the sample by subjecting it to a temperature gradient from the initial temperature to the intermediate temperature until the temperature of the sample in at least one part of the outer zone equals the intermediate temperature whilst the temperature of the sample in the inner zone is different from the said intermediate temperature,[[;]]
- (ii) (a) further changing the temperature of the said sample by subjecting it to the intermediate temperature until the temperature of the said sample in at least one cross-section is uniform and equals the intermediate temperature, the said changing is performed by placing the said sample in a region with the intermediate temperature, the said region having a length along the direction of

the movement of the said sample and the said length is not less the length of the sample along the said direction of movement,₁[[;]]

(b) moving the sample into the region with the intermediate temperature, until substantially the whole sample is within the said region,₁[[;]]

(c) pausing the movement of the sample within the said region until the temperature of the sample is substantially uniform throughout the sample and equals the intermediate temperature,₁[[;]]

(d) moving the sample out of the said region,₁[[;]] and

(iii) changing the temperature of the said sample until the majority of the said sample is at the final temperature.

123. (Currently Amended) A method for changing the temperature of a biological matter selected from the group consisting of semen, blood, blood cells, blood constituents and umbilical cord blood from an initial temperature via an intermediate temperature to a final temperature, one of the initial and final temperatures being above the freezing point of the said matter and the other being below the freezing point, comprising:

providing the said biological matter in the form of a sample whose having a minimal dimension in each of two mutually perpendicular cross-sections exceeds 0.5 centimeters, and at least one of the cross-sections having an outer zone and an inner zone such that the temperature of the sample in the outer zone changes quicker than that in the inner zone;₁[[,]]
and

changing the temperature of the said sample, the changing comprising by the
following steps:

- (i) changing the temperature of the sample by subjecting it to a temperature gradient from the initial temperature to the intermediate temperature until the temperature of the sample in at least one part of the outer zone equals the intermediate temperature whilst the temperature of the sample in the inner zone is different from the said intermediate temperature,[[;]]
- (ii) further changing the temperature of the said sample by subjecting it to the intermediate temperature until the temperature of the said sample in at least one cross-section is uniform and equals the intermediate temperature, and moving the sample into a region with the intermediate temperature and subjecting the sample to the intermediate temperature in the said region until the temperature of the said sample in each cross-section taken perpendicularly to the said direction reaches the intermediate temperature by the time it is moved out of the said region,[[;]] and
- (iii) changing the temperature of the said sample until the majority of the said sample is at the final temperature.